CURRICULUM VITAE

Richard Perrier Channing Rodgers, M.D.

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GENERAL INFORMATION

- **Current Appointment/Address**

Computer Science Branch
Lister Hill National Center for Biomedical Communications
Building 38A, Room 9S-916
National Library of Medicine
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- **Professional Interests**
  - Network-based biomedical information retrieval
  - Medical informatics (especially as applied to the clinical laboratory)
    - Computer-aided design optimization of biomedical analytical techniques
    - Statistical evaluation of the performance of diagnostic tests
    - Cost-effectiveness analysis of clinical procedures
    - Statistical mechanics of binder-ligand interactions

U.S. PUBLIC HEALTH SERVICE HISTORY

- **Clinical Specialty Consultant (1992-present)**

  - **Responsibilities**

    - In charge of development of the Information Sources Map (ISM), one of three components of the Unified Medical Language System™ (UMLS), a major multi-year research and development initiative of the National Library of Medicine. ISM applies novel technological approaches to the problem of locating Internet-accessible biomedical information in response to a specific human query.
    - Supervise one full-time contract programmer and one visiting worker, as well as visiting medical students and summer students.
    - Actively participate in NLM committees concerned with the redesign of NLM's online information services and the creation of new network-accessible services.
    - Represent NLM nationally and internationally through the presentation of original research and development work, and participation in standards-making bodies and professional organizations.

  - **Accomplishments**

    - Designed and implemented three progressively more sophisticated prototype applications for the UMLS ISM. Employing the World Wide Web, object-oriented including Java, Python, and CORBA (see below), and natural language technology developed by NLM colleagues, The current prototype accepts a user-supplied English-language biomedical query, determines which of ISM-registered sources

might provide helpful information, and then facilitates information retrieval from those sources. An associated application alows information providers to register new information sources with the ISM database via the Internet. This work is under active development.

• Devised and co-chaired the first Internet-based distributed expert panel at an international scholarly conference; presented as part of the Fifth International World Wide Web Conference in Paris, France (7 May 1996), the panel was concerned with the future of multicasting and the World Wide Web, and comprised five experts in Paris together with five experts participating from four different sites in California. Using MBONE multicasting technology, live audio, video, and whiteboard applications tied together the local and remote panelists, local attendees, and remotes attendees (who, via the Internet, could view and hear the panel as well as ask them questions).

• With colleagues on the ISM research team, introduced the Common Object Request Broker (CORBA) distributed object architecture to NLM's UMLS project, as a method for improving the development speed and reliability of software tools based upon the UMLS knowledge sources.

• Created HyperDOC,™ the original Internet Web-based hypertext/multimedia service of the NLM. HyperDOC was a World Wide Web (WWW) server, and was introduced when there were only a few hundred such servers world-wide (there are now estimated to be millions). It is thought to be among the first two Web servers made publically available by agencies of the U.S. government. During the first 3 years of operation, HyperDOC responded to over 8 million connections from over 370,000 distinct computers. At the end of that period, it was responding to approximately 50,000 connections per day from 5,000 distinct computers (80 percent domestic, 20 percent foreign).

• Created OnLine Images™ (OLI), the first deployed World Wide Web-based system for retrieval and display of specified items from large cataloged image archives. The OLI software has since been shared with NASA (which uses it to provide access to the entire collection of photographs taken during Space Shuttle missions) and several major universities.

• Vigorously promoted the use of World Wide Web and other network technologies by the NLM and NIH, other agencies of government, and elsewhere within the biomedical community, via numerous presentations, consultations with visitors, and collaborations for content creation with several sections of the NLM.

• Created Web-based multimedia programs about the history of NLM, the history of the NIH, the history of the U.S. Public Health Service (an online version of a pictorial history published in 1995), and numerous exhibits from the NLM's History of Medicine Division. These online exhibitions have been widely viewed, often more widely than the corresponding original printed documents and exhibits.

• Devised a plan to implement a network server for NLM information services using Z39.50, a major information retrieval standard protocol, recruited an appropriate expert to work on the problem for a year under an IPA agreement with the University of California, and collaborated in the successful completion of this task.

• Acted as founding Chairman of the NSF/NCSA World Wide Web Federal Consortium, a group of twelve federal agencies formed with two goals in mind: to fund further technical innovation at the National Center for Supercomputing Applications (which effectively launched a revolution in network-based information delivery with its introduction of NCSA Mosaic in 1993) and to promote the use of network technology to improve the effectiveness and efficiency of government.

• Organized a technically innovative meeting concerned with the subject of Internet-based information retrieval, the Special Interest Group for Networked Information

Discovery and Retrieval (SIGNIDR III, 1993). This was the first conference of its size to rely exclusively on network-based electronic systems: all speakers employed the World Wide Web to present their visual materials, and audio and video from the meeting itself was sent live over the Internet to over 80 sites around the world using a technology known as MBONE (Multicasting BACKbone). The proceedings remain available online via NLM's Web server.

- Served on the organizing and/or editorial committees of the Second, Third, Fourth, Fifth, Sixth, and Seventh International World Wide Web Conferences (Chicago, Darmstadt, Boston, Paris, Santa Clara, Brisbane, 1994-8) and on the editorial committee of the "Imaging on the Internet" track of the IS&T/SPIE Symposium on Electronic Imaging (San Jose, CA, January 1996).
- Participated actively in the deliberations of pertinent Internet standards-setting bodies, the Internet Engineering Task Force (IETF) and the Z39.50 Implementors Workshop (ZIG).
- Released five new annual editions of the UMLS Information Sources Map (ISM) database on CD ROM. Devised an automated software suite for internal consistency and error checking for this database.
- Established facilities at NLM to foster the creation and operation of network-based WWW information systems, including a multimedia authoring workstation, a graphical/statistical usage monitoring system, HTML validation tools, and a system for word-based indexing of multiple WWW servers over a network.
- Instigated participation by NLM staff in Bell Atlantic's experimental program to evaluate residential ISDN (digital telephony) service; evaluated this technology as a means of disseminating complex biomedical information, including images, audio, and video data.
- Managed NLM component of an interagency cooperative agreement with the National Science Foundation (NSF), dealing with work on the ISM project.
- Participated annually as an instructor in three teaching programs: a NLM-organized course in medical informatics held at the Woods Hole Marine Biological Laboratory; the NLM Medical Informatics Elective for medical students; the instructional program for NLM Library Associates; and, Internet-related tutorials at the American Medical Informatics Association (AMIA) national conferences.
- Arranged for an internal training course on the new computer language, Java, at the NLM.

- **Clinically Related Activities**

University of California, San Francisco, Department of Laboratory Medicine (1995, 1996). Worked within UCSF's clinical laboratory.

San Francisco Department of Veterans Affairs Medical Center (1994). Helped with the early stages of setting up a new molecular diagnostics facility in the clinical laboratory.

U.S. Coast Guard (1993). Devised and taught course related to physician office laboratory procedures and the quality control requirements of the Clinical Laboratory Improvement Act of 1988 (CLIA).

- **Continuing Education Within PHS**

Basic Project Officer Training Course (Research), 1993.

Writing Statements of Work — Non-Research and Development, 1994.

- **USPHS Support Activities**

  Chairman, Technical Evaluation Group 4 (Computerization of the Clinical Patient Record), Broad Agency Announcement (1993).

- **Inactive reserve (1980-1992)**

- **Senior Assistant Surgeon (1978-1980)**

PREVIOUS PROFESSIONAL APPOINTMENTS

1) Assistant Professor in Residence (1984-1987)
   Adjunct Assistant Professor (1987-1992)
   Department of Laboratory Medicine
   School of Medicine
   University of California, San Francisco
2) Assistant Research Chemist (1987-1992)
   Department of Pharmaceutical Chemistry
   School of Pharmacy
   University of California, San Francisco

EDUCATION & TRAINING

- **Postgraduate Education**

1) Resident in Laboratory Medicine (1982-1984). Department of Laboratory Medicine, University of California, San Francisco.
2) ICP Fellow (1980-1982). Unité de Médecine Expérimentale, International Institute of Cellular and Molecular Pathology, Université Catholique de Louvain, Bruxelles, Belgium. Studying the basic biophysical principles underlying latex particle agglutination assays in clinical medicine.
3) Research Associate (1978-1980). Laboratory of Theoretical Biology, National Cancer Institute, National Institutes of Health, Bethesda, Maryland, USA. Theoretical studies of radioimmunoassay and application of compartmental and non-compartmental computer modeling methods to problems in biology and medicine.
4) Research Fellow (1977-1978). Department of Nuclear Medicine, Middlesex Hospital Medical School, London, United Kingdom. Optimization of radioimmunoassay design using computer modeling methods.
5) Internal Medicine Resident (1976-1977). St. Mary's Hospital and Medical Center, San Francisco, California, USA.

- **Medical Information Science Training**

1) UNIX courses (1984). Academic Computing Services, University of California, Berkeley.
2) Term-time employment (1970-1971). Massachusetts General Hospital MEDLAB project.
3) Term-time employment (1968-1969). Department of Computer Science, Massachusetts General Hospital.
4) Summer employment (1969). Guest worker, Children's Clinic, University of Kiel, Federal Republic of Germany.
5) Summers employment (1967, 1968, 1970). Summer traineeship, Department of Biophysics and Bioengineering, University of Utah (a pioneering group in the discipline of medical computing).

- **Graduate Education**

  Doctor of Medicine (1976). University of Utah College of Medicine, Salt Lake City, Utah, USA.

- **Undergraduate Education**

  Bachelor of Arts *cum laude* in Biochemical Sciences (1972). Harvard College, Cambridge, Massachusetts, USA.
  Recipient of Harvard College and National Merit Scholarships

- **College Preparatory Education**

  Diploma (1968). Skyline Senior High School, Salt Lake City, Utah, USA.

- **Foreign Language Training**

  French, German.

- **Computer Languages / Operating Systems**

  Algol, awk, BAP, BASIC, C, FORTRAN, Java, MLAB, MUMPS, Pascal, perl, Python, SAAM, SAIL, TeX, troff;
  TOPS-10, TOPS-20, UNIX, VMS.

- **Other Types of Technical Training**

  Scientific illustration and photography.

PROFESSIONAL CERTIFICATION, LICENSURE, & MEMBERSHIPS

• Advanced Professional Certification

Diplomate in Clinical Pathology (June 1984), American Board of Pathology

• Professional Licenses

1) Physician and Surgeon, Commonwealth of Massachusetts (inactive status).
2) Physician and Surgeon, State of California.

• Professional Organizations

1) Member, Academy of Clinical Laboratory Physicians and Scientists.
2) Member, American College of Physicians.
3) Member, American Medical Informatics Association.
4) Fellow, College of American Pathologists.
5) Member, Internet Engineering Task Force (IETF) Working Groups on User Services.
6) Founding Member, International World Wide Web Conference Committee (IW3C2).
7) Member, New York Academy of Sciences.
8) Member, Society for Medical Decision Making.
9) Member, USENIX (UNIX Users' Society).
10) Member, Z39.50 Implementor's Workshop (ZIG).

RESEARCH & CREATIVE ACTIVITY

• Meetings Organized

1) Seventh International World Wide Web Conference (Brisbane, April 1998). International Conference Committee.
2) Sixth International World Wide Web Conference (Santa Clara, April 1997). International Conference and Editorial Committees.
3) Fifth International World Wide Web Conference (Paris, April 1996). International Conference and Editorial Committees.
4) Fourth International World Wide Web Conference (Boston, 11-14 December 1995). International Conference and Editorial Committees.
5) Federal Webmaster Workshop (Natcher Conference Center, NIH, 11-13 July, 1995). Attended by approximately 1000 federal workers and contractors. Organizing Committee, Chair of sponsoring organization (NSF/NCSA World Wide Web Federal Consortium).
6) Third International World Wide Web Conference (Darmstadt, 10-14 April 1995). International Conference and Editorial Committees. Co-directed the multicasting of live audio and video from the meeting over the Internet via the MBONE virtual network to approximately 400 remote participants, organized a remote conference site at the NLM.
7) Second International World Wide Web Conference (Chicago, 17-20 October 1994). This meeting attracted over 1300 attendees, participating in multiple simultaneous sessions. Directed the multicasting of live audio and video via MBONE to approximately 400 remote participants.
8) Z39.50 Implementor's Group (ZIG) (NLM, April 1994). The meeting, which included over 60 participants, continued work on defining version 3 of the Z39.50 standard, an important protocol for network-based delivery of bibliographic and other information, which is important to NLM's future information services.

9) SIGNIDR/SIGWAIS III (Lister Hill Center, 12 November 1993). Dealing with Internet-based information retrieval by computer, this meeting was attended by over 180 participants at the Lister Hill Center, and seen by viewers at over 80 remote sites scattered throughout the world, by means of being simulcast over the Internet using the experimental *MBONE* multicasting system. Traditional audiovisual aids were banned from the meeting, with all presentation materials being projected from a UNIX computer workstation using a program known as NCSA Mosaic. This technically complex meeting was intended to be a prototype for the electronic meeting of the future.

• Editorial Boards

1) Associate Editor, Computers in Biology and Medicine (Pergamon Press).
2) Editorial Committees, Second-Sixth International World Wide Web Conferences.
3) Editorial Committee, IS&T/SPIE Symposium on Electronic Imaging (San Jose, CA, January 1996.

• Articles Reviewed for Other Journals:

1) Analytical Biochemistry
2) Archives of Pathology and Laboratory Medicine
3) Biopolymers
4) Clinical Chemistry
5) Computers in Biomedical Research
6) Immunology
7) Journal of the American Medical Informatics Association (JAMIA)
8) Journal of Clinical Chemistry and Clinical Biochemistry
9) Journal of Immunoassay
10) Journal of Theoretical Biology
11) Medical Decision Making
12) Southern Medical Journal

• PHS Honors and Awards

1) PHS Commendation Medal, 1998.
2) Outstanding Achievement Award, NSF/NCSA World Wide Web Federal Consortium, 30 July 1995.
3) PHS Commendation Medal, 1994.

• Grants and Awards

1) Grant, San Diego Supercomputing Facility (CRAY computing time for Monte Carlo simulation of random sphere aggregation, 1986).
2) Grant, Research Corporation ($10,500 for particle aggregation modeling, 1985).
3) Grant, Research Evaluation and Allocation Committee ($4000 for critical review of the diagnostic efficiency of laboratory tests, including the bleeding time, 1985).
4) Grant, Academic Senate of the University of California ($6000 for particle aggregation modeling, 1985).
5) Research Associateship Award, Veterans Administration Research Career Development Program, providing full salary support for entry-level faculty appointment (July 1984-June 1987).

6) FEBS travel grant, Nov. 1981, to allow travel from Brussels, Belgium, to the United Kingdom for initiation of a collaboration on the basic principles of latex agglutination reactions with Prof. Manfred Gordon of the Universities of Essex and Cambridge.

• Software Designed & Written

1) *Lister Hill Staff Directory System* (1997-): a Web-based system for managing and presenting a pictorial online staff directory.

2) *Lister Hill Automated Document Submission System* (*ADS*; 1997-): a Web-based system for the automatic installation of documents onto a Web server from a remote computer: allows the delegation of authority for control of the content of individual documents in a centralized Web document collection.

3) *Lister Hill Adaptive Responce Interface* (*LHARI*; 1996-): a World-Wide Web system that allows a WWW server to tailor the documents it delivers so as to be more appropriate for the user's Web browser, along with a set of local navigation and service aids that is context-depenent.

4) *NLM_depot* (1996-): a modified version of a system developed at the University of Texas, Austin, to manage a network-shareable local software repository for UNIX systems.

5) *Common User Environment* (*CUE*; 1996-): a set of files that helps standardize the UNIX user environment to increase the efficiency of computer use and software development.

6) *Sourcerer* (1994-): currently in prototype, this system utilizes the Metathesaurus and semantic network of the NLM's Unified Medical Language System (UMLS), natural language-processing tools developed elsewhere at NLM, the World Wide Web, and object-based computer technology. It adheres to open standards as promulgated by the Internet Engineering Task Force (IETF) and other relevant bodies. It accepts English-language queries, determines which ISM-registered information sources are appropriate to respond to the query, and facilitates retrieval of information from the identified sources.

7) *Bugs on the Web* (1994): an experimental prototype World Wide Web-based multimedia/hypertext system for computer-aided instruction in parasitology, being developed in collaboration with Dr. Dan Ricks of the London School of Hygiene and Tropical Health. This project also represents a novel attempt at a network-distributed edited work, building upon visual materials contributed by a number of recognized authorities in the field of parasitology.

8) *OnLine Images* (OLI, 1994-present): a system for the retrieval and presentation of specified portions of large cataloged image archives, via the World Wide Web. This system was first applied to 59,000 images from the prints and photographs collection of the NLM's History of Medicine Division. This system is publically accessible via NLM's Web services, and as of October 1994, was delivering over 41,000 files per month to over 1860 distinct computers. This technology is being shared with other groups: twenty organizations have indicated a desire to use OLI to deliver their image collections, and the first of these, NASA, already has a working prototype in testing.

9) *HyperDOC* (1993-1996): a hypertext/multimedia information retrieval system for the National Library of Medicine (1993). Employing a system known as *World Wide Web*, and accessible via the Internet computer network, HyperDOC included a mixture of images, text, audio files, and full-motion video files describing activities and services at the NLM; access to on-line interactive adaptations of exhibits from the NLM's History of Medicine Division, the National Cancer Institute, and the office of the PHS historian; and, on-line databases and catalogs. HyperDOC served as the focus of new initiatives throughout the NLM, concerned with network-based information delivery. It also provided the DHHS and PHS with their first public presence on the World Wide Web.

   With the transfer of the principal NLM Web services to an operational arm of the Library, work on innovative Web server and document design continues, in the form of work on a

new Web server for the Lister Hill National Center for Biomedical Communications (LHNCBC).

10) The *UMLS Information Sources Map* (ISM; July 1992 — June 1993): released two new revisions of this pre-existing database of biomedical information sources; these were validated by an extensive set of original software tools designed for internal consistency checking and error detection and correction

11) *BibIX*: a comprehensive bibliographic database and text formatting system, integrated with E^{T}T. Current release: 2.1 (1992). This package is licensed to commercial software vendors by the Berkeley Office of Technology Licensing.

12) *System Manager's Toolkit*: suite of programs and documentation for automated system administration of a UNIX computing facility. Current release: 2.1 (1992). Distributed by the Berkeley Office of Technology Licensing.

13) *batchqueue*, an automated batch job queuing system for BSD UNIX. Current release: 2.1 (1992). Distributed by the Berkeley Office of Technology Licensing.

14) *AcademIX*, a suite of programs to facilitate routine academic office functions under UNIX, including *UNIletter*, an automated correspondence system, and *CV*, a *curriculum vitae* maintenance system. Current release: 2.1 (1992). Formerly distributed by the Berkeley Office of Technology Licensing.

15) E^{T}T (*UCSF Enhanced troff/*TRANSCRIPT), a comprehensive text-formatting environment for academics. Current release: 2.2. Formerly distributed by the Berkeley Office of Technology Licensing.

16) *contor*: a menu-driven front-end for contour mapping with the <PLOT79> scientific line graphics package (1980-87).

17) <*PLOT79*>: collaboration with primary author Nelson Beebe in UNIX installation and extension of this comprehensive scientific line graphics package (1986-present).

18) INSULIN: an MLAB program for fitting insulin receptor ligand binding data.

19) CLASP: 19,000 line FORTRAN77 program for comprehensive simulation of radioimmunoassay.

• Invited Presentations

1) *NLM's Unified Medical Language System (UMLS) and the World Wide Web: A Re-Engineering Toolkit for Access to Biomedical Information*, plenary address, Computers in Healthcare Education Symposium, Thomas Jefferson University, Philadelphia, 25 April 1997.

2) *The Internet, Near-Death Experiences, and Telepathology*, Armed Forces Institute of Pathology Workshop in Telepathology, Uniformed Services Health Sciences University, 1 July 1997.

3) *Internet at the Cutting Edge*, half-day tutorial at the American Medical Informatics Association Fall meeting, Washington, D.C., 26 October 1996.

4) *The UMLS Information Sources Map (ISM) — An Update & Demonstration*, a presentation before the Lister Hill Center's Board of Scientific Counselors, NLM, 10 October 1996.

5) *Visible Human Project*, Federal Webmaster Workshop, NIH, 8 August 1996.

6) *The Challenge of Finding the Information You Need in the Face of Explosive Growth of Internet-Based Resources*, Clinical Chemistry on the Information Superhighway (satellite meeting of the XVI International Congress of Clinical Chemistry), Stratford, United Kingdom, 5 July 1996.

7) Organizer and Co-Chair, Panel PN3, *Multicasting and Real-Time Applications and the Future of the Web: A Network-Distributed Panel* Fifth International World Wide Web Conference, Paris, France, 7 May 1996.

8) *The World Wide Web and Digital Video on the Internet*, a tutorial presented by Dr. Daniel R. Masys of the University of California (San Diego) at the Seminar on Computer Applications in Medical Care (SCAMC), New Orleans, LA, 29 October 1995. Dr. Masys employed video-taped presentations of various technology demonstrations created for the occasion by R. P. C. Rodgers.

9) *Automated Source Selection: The UMLS Information Sources Map & the Sourcerer Project*, a presentation before the Lister Hill Center's Board of Scientific Counselors, NLM, 26 October 1995.

10) *The Challenge of Resource Location in the Context of a Networked Planet*, presentation to the Workshop on Electronic Publishing in Biomedical Research, INSERM, Obernai, France, 16 October 1995.

11) *Sourcerer*, Federal Webmaster Workshop, NIH, 13 July 1995.

12) *OnLine Images from the History of Medicine*, Federal Webmaster Workshop, NIH, 13 July 1995.

13) *Z39.50*, Federal Webmaster Workshop, NIH, 12 July 1995.

14) *Information Discovery*, a panel held at the Federal Webmaster Workshop, NIH, 11 July 1995.

15) *The Information Superhighway: New Navigational Tools*, Institute on Federal Library Resources, NLM, 31 July 1995.

16) *NLM World Wide Web Database Projects*, INET '95, Honolulu, HI, 28 June 1995.

17) *The Internet and the World Wide Web* combined lectures and laboratory sessions, presented as part of a NLM-organized course in Medical Informatics at the Woods Hole Marine Biology Laboratory, 1-2 June 1995.

18) *Graphical Health Information via the World Wide Web*, a presentation made as part of a briefing for the Congressional Caucus on Telemedicine and Informatics, Dirksen Bldg., Washinton, DC, 24 May, 1995

19) *Internet Access*, a presentation before the International Conference on Harmonization Expert Working Group, NLM, 30 March 1995.

20) *Browsing the Internet*, Seminar Series of the MIT Club of Washington, 14 March 1995.

21) *The Internet: The Ultimate Tool for International Scientific Collaboration*, Fogarty International Center, NIH, 14 March 1995.

22) *Linking Data: Navigating the Highway*, a presentation made as part of the White House Mini-Conference on Aging, *Accessing Eldercare via the Information Highway: Possiblities and Pitfalls*, NIH, 8 March 1995.

23) *On-Line Images from the History of Medicine*, a presentation before the Board of Regents of the National Library of Medicine, 25 January 1995.

24) *NLM Resources Available on the Internet*, a presentation for the D.C. Science Writers Association and the American Medical Writers Association, NLM, 17 November 1994.

25) *World Wide Web (WWW) as an Exemplar of the Optimal Strategy for a Successful Internet Application*, Electronic Publishing in the Federal Government: Panel on Projects Using SGML and HTML, National Agricultural Library, Greenbelt, MD, 17 November 1994.

26) *World Wide Web and Digital Video on the Internet*, a tutorial presented in collaboration with Professor Lawrence Rowe of the University of California (Berkeley), Seminar on Computer Applications in Medical Care (SCAMC), Washington, DC, 5-6 November 1994.

27) *HyperDOC and the World Wide Web as Tools for Biomedical Information Retrieval*, a presentation to Japanese attendees at the Baltimore IEEE meeting, NLM, 3 November 1994.

28) *On-Line Images from the History of Medicine*, CENDI meeting, NLM, 6 October 1994.

29) *On-Line Images from the History of Medicine*, a presentation before the Board of Regents of the National Library of Medicine, 28 September 1994.

30) *The National Library of Medicine on the Internet: A Digital Library for Biomedicine*, American Chemical Society annual meeting, Washington, DC, 23 August 1994.

31) *The Evolution of the Internet: Putting the Internet to Work*, a combined lecture and laboratory session, presented as part of a NLM-organized course in Medical Informatics at the Woods Hole Marine Biology Laboratory, 1 June 1994.

32) *The Internet as a Tool for Biomedical Information Retrieval*, San Francisco Department of Veterans Affairs Medical Center, 13 May 1994.

33) *On-Line Images from the History of Medicine: An Internet-Based tool for Scholars*, Bay Area History of Medicine Club & the UCSF Library and Center for Knowledge Management, University of California, San Francisco, 11 May 1994.

34) *The World Wide Web and the NLM's Information Sources Map (ISM) Project*, Department of Medical Informatics, University of Utah College of Medicine, 10 May 1994.

35) *The NLM's UMLS Project, and the Information Sources Map (ISM)*, Eccles Medical Library, University of Utah College of Medicine, 10 May 1994.

36) *Recent Developments in Information Dissemination on the Internet*, Grand Rounds of the Department of Laboratory Medicine, University of California, San Francisco, 2 May 1994.

37) *An Introduction to the Internet*, a tutorial, American Medical Informatics Association (AMIA) Spring Congress, San F5ancisco, 4 May 1994.

38) *The Internet and the Ongoing Revolution in Biomedical Communications*, Department of Pathology, National Children's Medical Center, Washington, DC, 11 January 1994.

39) *What this Meeting is About: An Introduction, Outline, & Acknowledgments*, SIGNIDR III (Special Interest Group for Networked Information Discovery and Retrieval), NLM, 12 November 1993.

40) Panel member, *Network Information Navigation*, Medical special interest area, American Society for Information Science (ASIS) national meeting, Columbus, Ohio, 28 October 1993.

41) *Network-Based Information Retrieval*, a presentation before the Toxicology Round Table at the NLM, 20 October 1993.

42) *NCSA Mosaic for X*, a presentation before the Board of Regents of the National Library of Medicine, 30 September 1993.

43) *NCSA Mosaic for X*, a presentation before the staff of the Office of the Director, National Library of Medicine, 14 September 1993.

44) *The Internet*, a day-long combined lecture and laboratory session, presented as part of a NLM-organized course in Medical Informatics at the Woods Hole Marine Biology Laboratory, 1 June 1993.

45) *A critical reappraisal of the bleeding time test*, Division of Laboratory Medicine, School of Medicine, University of Wisconsin, Madison, WI, 12 November 1990.

46) *Selecting assay software: many questions, fewer answers*, BIO-CLUB Mini-Course on ELISA Software, Free University of Brussels, Brussels, Belgium, 28 June 1990.

47) *A critical reappraisal of the predictive value of the bleeding time*, Session on Utilization of Screening Tests, American Society of Hematology, Atlanta, GA, 3 December 1989.

48) *Predictive value of the bleeding time: applying new tools to an old test*, Laboratory Medicine Grand Rounds, UCSF, San Francisco, 6 November 1989.

49) *Basic principles of ligand assay data processing and quality control*, Molecular Devices, Palo Alto, CA, 22 March 1989.

50) *Basic principles of ligand assay data processing and quality control*, Genentech, South San Francisco, CA, 9 November 1988.

51) *The UNIX-based bibIX bibliographic system and how it may serve the MMWB group*, MacroMolecular WorkBench seminar, 6 April 1988.

52) *The theory of stochastic branching processes (the cascade formalism) applied to aggregation phenomena*, MacroMolecular WorkBench seminar, 9 December 1988.

53) *Medical Decision Sciences and Clinical Test Evaluation: A Critical Re-evaluation of the Bleeding Time Test*, Health Informatics Seminar, University of Minnesota, 12 November 1987.

54) *A Cost-Effectiveness Model for Laboratory Quality Assurance*, Department of Laboratory Medicine and Pathology, University of Minnesota, 11 November 1987.

55) *Cascade theory applied to latex particle agglutination assay*, City of Hope Medical Center, Duarte, CA, October 1987.

56) *A physical model for latex particle agglutination assays based upon cascade theory*, Department of Pathology, State University of New York at Stony Brook, 27 April 1987.

57) *The theory of stochastic branching processes applied to latex particle aggregation phenomena*, Dill-Siegel research group meeting, UCSF School of Pharmacy, 18 February 1987.

58) *Automated assay data processing and quality control: A review and recommendations*, International Symposium on Radioimmunoassay and Related Procedures in Medicine, Vienna, Austria, 21-25 June 1982.

59) *A formal model for the cost-effectiveness of assay quality control*, International Symposium on Cost and Benefit of Radioimmunoassay, Milan, Italy, 15-16 May 1984.

• Inventions

1) Kit for determination of total lung capacity from routine chest radiograms using a hand-held calculator.

2) Disposable micro-dialysis cell.

LIST OF PUBLICATIONS

• Monographs, Books and Book Chapters (Authorial Index* = 7.00)

1. **Stites, DP, Rodgers, RPC**. Clinical laboratory methods for detection of antigens and antibodies. In: Stites, DP, Terr, AI, eds., *Basic and Clinical Immunology*. Norwalk, Connecticut: Appleton and Lange, 1996. Ninth edition.
2. **Stites, DP, Rodgers, RPC**. Clinical laboratory methods for detection of antigens and antibodies. In: Stites, DP, Terr, AI, eds., *Basic and Clinical Immunology*. Norwalk, Connecticut: Appleton and Lange, 1993. Eighth edition.
3. **Stites, DP, Rodgers, RPC**. Clinical laboratory methods for detection of antigens and antibodies. In: Stites, DP, Terr, AI, eds., *Basic and Clinical Immunology*. Norwalk, Connecticut: Appleton and Lange, 1991: 217-262. Seventh edition.
4. **Rodgers, RPC**. Data Processing of Immunoassay Results. In: Fahey, JL, Friedman, H, Rose, NR, eds., *Manual of Clinical Laboratory Immunology, 3rd Edition*. Washington, D.C.: American Society for Microbiology, 1986: 82-87.
5. **Rodgers, RPC**. Data analysis and quality control of assays: a practical primer. In: Butt, WR, ed., *Practical Immunoassay: The State of the Art*. New York: Dekker, 1983: 253-308.
6. **Rodgers, RPC**. *Data Processing and Quality Control in Binder-Ligand Assay: A Practical Introduction*. Anaheim, California: Scientific Newsletters, Inc., 1981. (329 pages).
7. **Rodbard, D, Rodgers, RC**. The kinetics of radioligand assays. In: Antoniades, HN, ed., *Hormones and Human Blood*. Cambridge, Massachusetts: Harvard University Press, 1976: 92-114.
8. **Rodgers, RPC**. *Radioimmunoassay Theory for Health Care Professionals*. Loveland, Colorado: Hewlett-Packard Co., 1974. (55 pages).
9. **Rodgers, RPC**. *Equilibrium and Transient-State Mathematical Theory of Saturation Analysis*. 1972. (130 pages). Thesis, Program in Biochemical Sciences, Harvard College (awarded *summa cum laude* grade).

• Proceedings of Scholarly Meetings (Authorial Index = 3.83)

1. **Rodgers, RPC**. *NLM World Wide Web Database Projects*. Honolulu, HI: 27-30 June 1995. Proceedings, INET '95 (available online via http://info.isoc.org/HMP/PAPER/240/abst.html).
2. **Rodgers, RPC, Srinivasan, S**. *On-Line Images from the History of Medicine (OLI): Creating a Large Searchable Image Database for Distribution via World-Wide Web*. Geneva: 25-27 May 1994: 423-431. Proceedings, The First International World-Wide Web Conference.
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* The Authorial Index is the sum, for all publications in a category, of [1 / (Number of Authors)]

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